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IH: Carburetor, Intake Manifold & Exhaust

FACTORY CARBURETORS

Linkert Model M and DC Carbs (1957-1965)

Sub Documents

- Linkert Carb Identification
- Rebuilding the Linkert Carb
- Linkert Carb Functions, Adjustments, Tuning.

- Three different carburator families were used on the K and Sportsters through 1969. Three models of the venerable Linkert Model M carbs were used on K and KH. Sportsters used various incarnations of the Linkert DC and M carbs from 1957 through 1965. [1)]

The Linkert Model M

- The model M carburetor is a plain tube carb containing a venturi and a discharge nozzle through which fuel is drawn into the air stream passing through the venture. The quantity of fuel is metered by two jets or openings (one for low speed and the other for high speed) before entering the nozzle.
- Needle valves in the low and high speed passages allow the carburetor to be adjusted for the slightly varying and individual needs of the engine. Once the carb is adjusted, it requires little if any attention. At most, adjustments might be a few clicks or notches richer or leaner on the needles are all that should be needed to correct air/ fuel mixture for changes in weather condition. All final adjustments should be made at full operating temps. [2)]
- Features:
    - High and low speed needles
    - Low speed needle lift lever
    - Throttle lever
    - Throttle lever lock screw
    - Throttle stop
    - Bowl vent
    - Choke lever and disc
    - 1-5/16“ Venturi (27363-41) for 1954-1956 KH models[3)]
- (27146-52) M53 (1952) for all Harley K models[4)]

- (27146-52A) M53A1 (1952-1956) for all Harley K models replaced the M53 with: [5)]
  - New intake lever and shaft (52-53) replaced again for (54-56)[6)]
  - New float assembly (27380-33A) replaced these two previous ones (27380-33) & (27380-52) [7)]
  - New carburetor support bracket (basically an “L” bracket on the bottom of the float bowl.) [8)]
- Most K models ran a Linkert M model Carb up until around 1965.

The Linkert Model DC

- The model DC is a plain tube carburetor. It's main air/ fuel mixture passage consists of a venturi section and discharge nozzle. A fixed jet and adjustable high speed needle valve, of limited, meter the high speed fuel supply as it is fed into the venturi section of the throttle barrel. The low speed needle valve meters the low speed fuel/ air mixture as it is fed into the throttle barrel near the throttle disc. There are no moving parts except the throttle shaft, disc and the bowl float mechanism. [9)]
- The Linkert DC found on the 1959-1965 Harley Servi-car 45 flathead was left-handed, the float was on the right side of the ones put on Sportsters and Big-twins, since Harley flatheads have the carburetor on the left side of the engine. Other than the Harley Shovelhead carb and the DC-2 on the Servi-car, all Linkert DC versions have the same carb body with the same size venture, with a one-piece casting and the difference was changing the jet size, and modifying the inlet valve. [10)], found primarily on '50s and '60s Harley-Davidson Sportsters.
  - Being simple in design:
  - Choke lever assembly for 1957 models only
  - Throttle lever stop
  - Main nozzle float valve and seat
  - Idle tube assembly
  - Float bowl mounted on right side
  - Venturi
  - Discharge nozzle
  - Adjustable high and low speed nozzles, and a fixed jet.

All except DC2 are the same body. NOS bodies actually were shipped blank and the dealer stamped the number needed on them. [11)]
If you have a larger bore body using a 9X throttle disc, this is from the modification bulletin Harley put out on the DC carbs many years ago.
Differences on all except the DC2 were in jet sizes, needle & seats, bowl lettering, etc, all minor.
They did not make a DC3, DC5, DC8, DC9, or DC11. (“real” DC11 “race” carbs were modified versions of other DC models as per the race mod bulletin Harley put out)
Here is a link to that drawing at Into The Wilderness Trading. (whether by Harley themselves for the XLR or by a particular dealer)
Linkert did not make DC11 carbs as such, and you will also find these mods on every model out there except DC2.
A few are well done and re-stamped as DC11 (probably by Harley for racers). Some very poor quality backyard jobs with the idle ports ruined, so look them over carefully.

Sportster Carb Model	Idle Bleed	Idle Tube Feed	Fixed Jet	Throttle Disc	High Speed Setting	Idle Speed Setting
27155-57 [12] **1957-1958 Sportster**						
DC-1 [13] Standard 1957 (only)	#53 .0595	#69 .0293	#9 .067	9A [14]	3/4” to 1-1/4“	3/4” to 1“ [15]
27155-57A [16] **1959-1960 Sportster**						
DC-1L [17] Standard 1958-1960	#53 .0595	#69 .0293	#4 .0625	9A [18]	3/4” to 1-1/4“	1” to 1-1/4“ [19]
DC-1M [20] Miltary XLA	#53 .0595	#69 .0293	#1 .052	9A [21]	3/4” to 1-1/4“	1” [22]
27155-57B [23] **1961-1965 Sportster**						
DC-6 [24] Standard 1961	#53 .0595	#69 .0293	#4 .0625	9A [25]		
DC-10 [26] Standard 1962-E1963	#53 .0595	#69 .0293	#4 .0625	9A [27]	3/4“ to 1-1/4”	1“ to 1-1/4” [28]
DC-12 [29] Standard L1963-1965	#53 .0595	#69 .0293	#4 .0625	9A [30]		

Other HD Carb Model	Idle Bleed	Idle Tube Feed	Fixed Jet	Throttle Disc	High Speed Setting	Idle Speed Setting
DC-2 [31] 1959-65 Servicar (smaller venturi, opposite float bowl)	#51 .067	#70 .028	#20 .0452	12 [32]	3/4“ to 1-1/4”	1“ to 1-1/4” [33]
DC-7 [34] 1966 Big-Twin FL and FLH (larger venturi)	#53 .0595	#69 .0293	.070	9A [35]		
DC-12 [36] 1966 Big-Twin FL and FLH	#53 .0595	#69 .0293	#4 .0625	9A [37]		

Tillotson HD Carb (1966-1971)

Sub Documents

- Tillotson Carb Identification
- Rebuilding the Tillotson Carb
- Tillotson Carb Functions, Adjustments, Tuning.

- 1966-1971, Sportsters used the universally beloved Tillotson Model HD, [38]which was less sensitive to lean and tilt, and also helped power and driveability. [39]
- The model HD is a dual-venture, diaphragm-type carburetor with an automatic economizer and accelerating pump. The fuel inlet needle is operated by a compression spring balanced lever that is controlled by the diaphragm to regulate fuel flow into the metering chamber. The amount of fuel flowing into the carb metering chamber is exactly equal to amount of fuel demand of the engine. [40]
- This type of fuel control operates at any tilt angle and is resistant to any vibration which could cause a poor fuel/ air mixture or flooding.[41]
- The small primary venture is offset to the bottom of the large secondary venture where the main nozzle outlet protrudes from the metering chamber. The accel. pump discharges into the small venture to take advantage of the venture pressure drop that breaks up the solid stream of accelerating-pump fuel.[42]
- The accelerating unit is a positive-acting plunger type pump connected to the throttle shaft through a cam lever. The pump plunger is a spring loaded leather cup that operates in a smooth plastic cylinder drawing fuel directly from the metering chamber to provide extra fuel for acceleration.[43]
- The automatic economizer is a hydraulically operated enrichment valve controlling the main nozzle fuel mixture at very low engine speed. The valve opens an auxiliary fixed main jet as the venture air flow decreases, allowing the fuel mixture to be maintained at a full power richness. As the air flow through the carb increases, or as engine speed increases, the valve closes to prevent an over-rich mixture at intermediate speeds. [44]
- All late 1968 Electra Glide and Sportster model carbs receive an upgrade incorporating a ball check valve in the accelerator pump passage of the plastic cover.This was to provide a positive seal against air bleeding back from the venturi into the fuel chamber. [45]
    - Air bleeding into the fuel chamber thru the accel pump passage can cause poor or erratic accel pump action, surging at cruising speeds and hesitation upon acceleration from cruise speeds, a vapor lock condition while running from high speds to cruise speeds and a tendency to stall when idled.
- **Choke/ Initial Startup**: The choke is in the closed position. As the engine is cranked, the entire metering system (idle, intermediate and nozzle) is subjected to engine suction which is transmitted to the fuel chamber, via the metering channels, creating a low pressure on the fuel side of the metering diaphragm. Atmospheric pressure from the vent moves the metering diaphragm toward the inlet control lever to allow fuel to enter carb thru the needle and seat. Fuel is then forced thru the metering system out into the carburetor mixing passage and into the manifold and engine. When the engine fires up, the volume of air drawn thru the carb increases, and the spring loaded top half of the choke shutter opens to provide the additional air required by the engine, to prevent an over-rich mixture. The choke can then be moved to a half-open position for engine warm-up. During hot weather or after the engine has been run long enough to reach stable operating temperature, and then shut off for a short period of time, a small amount of fuel vapor may form in the fuel lines or in the fuel chamber of the carb. The vapor in the fuel lines will enter the fuel inlet and rise out of the fuel outlet, to be vented back into the fuel tank. The vapor that forms in the fuel chamber must escape through the metering system because there is no other vent to the fuel chamber. Starting a warm engine is most easily accomplished by placing the choke in the half closed position and starting as described. The choke helps to quickly remove the vapor out of the fuel system so that the fuel flowing through the carb and fuel line can cool the system to a normal temperature. Starting is usually easier using the choke (full choke for cold engine, half choke for warm engine). [46]

- **Idle Operation**: The throttle shutter is slightly open when the engine is idling and the carb mixing passage on the engine side of the throttle shutter is exposed to engine suction, while the mixing passage between the throttle shutter and the air cleaner is at nearly atmospheric pressure. Engine suction (transmitted through the primary idle discharge port to the fuel chamber side of the metering diaphragm via the bypass chamber, idle fuel supply channel, intermediate adjustment channel, nozzle well, main fuel jet and main fuel supply channel) creates a sub atmospheric pressure in the fuel chamber. The metering diaphragm is forced upward by atmospheric pressure, moving the inlet control lever to overcome the inlet compression spring pressure, allowing fuel to enter the fuel chamber through the inlet needle and seat. Fuel flows through the main supply, main fuel jet, nozzle well, intermediate adjustment channel (where it mixes with air from the idle air-bleed) idle fuel supply channel, to the bypass chamber, where it mixes with air from the secondary idle discharge ports, and on out into the carb mixing passage through the primary idle discharge port. The mixture of well atomized fuel and air then travels through the manifold and into the engine combustion chamber. [47)]
- **Acceleration**: Acceleration is accomplished by the use of a positive-acting accelerator pump, actuated by a cam lever from the throttle. The pump cylinder is filled when the pump is raised to the top of it's stroke. Fuel is drawn from the fuel chamber, through the accelerating pump inlet channel, past the inlet check valve. The outlet check valve is closed to prevent air from being drawn in to the accelerating pump system. As the accelerating pump is depressed, the pressure of the fuel closes the inlet check valve, the fuel flows through the pump channels, past the outlet check valve, through the accelerating pump outlet channel and through the boost venture into the carburetor mixing passage. [48)]
- **Intermediate or Cruise Operation**: Fuel is delivered into the carb and as the throttle shutter opens to increase engine speed, the secondary idle discharge ports are exposed to engine suction and fuel is delivered from both the primary and secondary idle discharge ports to supply the additional fuel demand by the engine. As the throttle shutter is opened farther, the air velocity through the boost venture increases, creating a low pressure area at the nozzle outlet. Fuel flows from the fuel channel through the nozzle outlet via the nozzle well, main fuel jet, main fuel supply channel, and economizer valve when the pressure at the nozzle outlet is less than the pressure in the fuel chamber. At idle and lower intermediate speeds, the check ball in the economizer valve is away from the seat, allowing free flow from the fuel chamber through the economizer valve to the nozzle well and nozzle outlet. Fuel flow from the primary and secondary idle ports decreases as fuel flow from the nozzle outlet increases. [49)]
- **High Speed Operation**: Fuel flow from the nozzle outlet increases as the shutter is opened past the intermediate position to the fully open position. Fuel is delivered through the nozzle outlet from the fuel chamber via the main fuel supply channel and the main fuel jet. The increased pressure difference between the small venture and the metering chamber, plus the force of fuel flowing through the economizer valve, causes the check ball to seat, stopping the fuel flow from this part of the main metering system. This gives increased economy at high speeds. The diaphragm action and the method of fuel delivery to the fuel chamber is the same as previously described. [50)]
- Features: [51)]
    - Low speed needle
    - Intermediate needle
    - Throttle lever
    - Throttle stop
    - Choke lever
    - Accelerator pump

- Inlet and vent fittings
- Diaphragm
- Intake Manifold (27021-57) [52)]

HD-1A was the 66 version, no pump check ball, used the no drill insulator and the “wraparound” cable bracket is the same as the 67-71. 66 uses the Linkert bracket [53)] Fuel pressure and the weight of the needle alone move the needle away from the inlet seat. [54)]
HD-1B Starting after engine #66XLCH-10611, the carb has a new inlet valve lever, needle and seat assembly to help correct problems such as high speed leaning out caused by vibration and needle sticking due to dirt / debris in carburetor. The stamped ID has the model stamped on the flange near the idle mixture adjustment wheel. The new lever had a forked end which engaged a groove in the new inlet needle seat stem which locked the lever to the needle providing diaphragm control of the needle movement in both directions. It was recommended to install this update into the HD-1A carb (where definite carburetor problems exist) [55)] 67-E68 used the 'standard' choke and throttle shafts, no pump check, insulator gets drilled for over the top. Same pn. This insulator gets used on e67CH, 70-71CH and 67-71 XLH. 67-69 CH gets its own insulator. New pn for this one. Same part as others, this vintage except the lower stud is now longer for the plug wire router to mount.[56)]
HD-1BC or **HD-1C** Late 1968 Sportsters (Carb # 27162-66B) received a ball check valve in the accelerating pump passage of the plastic cover which provides a seal against air bleeding back from the venturi into the fuel chamber. [57)]. L68-69 HD1C gets the pump check.[58)] 70-71 HD1D different body casting. may be different low speed circuit.[59)]

HD-2A **HD-2AB** **HD-2B**	Electra Glide models [60)] w / pre lever needle and seat assembly
HD-2AC **HD-2C**	Electra Glide models [61)] with new lever needle and seat assembly

27804-66	Diaphragm Cover without the ball check valve
27804-66A	Diaphragm Cover the ball check valve

Tillotson Carbs (1968-1971) [62)] [63)]

Serial Number	Main Jet
27160-66B [64)] Big Twin	
27162-66B [65)] Sportster	
27162-66C [66)] Sportster	0.053“, 0.055”, 0.059“, 0.057”, 0.061“, 0.063” [67)]
27155-66RA (XLR)	(27823-66R)
27155-70R (XR)	(27823-66R)

Torque Specs	Inlet Needle Seat	40-45 in/lbs (4.5-5 Nm)
	Diaphragm Cover Plug	23-28 in/lbs (2.6-3Nm)
Carb Idle Speed	900- 1,100 RPM [68)]	

Mikuni XR-750 racing engines only

1972-1980

Through 1980, XR-750 engines were equipped with a 36mm Round Slide[69] Mikuni. Below is a chart of the standard jetting of these carbs. Final jetting may vary. [70]

36mm Carb Types	Main	Pilot	Needle	Needle Jet	Slide	Air Correction Jet
VM-36-1 VM-36-4 VM36/39	240	25	6F5	159-P4	2.0	1.0

1989-2003

Engine upgrades prompted HD to recommend the use of Mikuni's 38mm Flat Slide carburetor (not supplied with the engine kit). Recommended jetting chart below.[71]

38mm Carb Types	Main	Pilot	Needle Jet	Slide	
TM38-85 (47mm spigot dia.) TM38-86 (43mm spigot dia.)	210-260	20-25	6FM46	Q0,Q2,Q4	4.0

- Most Mikuni carbs have a backwards Idle mix screw, in to richen, out to lean. [72]
- The longer carb provides a better signal to the fuel metering business inside. This is why the round slide carb works so well combined with the taper on the slide and needle. The round slide carb will have a wider sweet spot than a flat slide [73] and that equates to better low range. [74]

Mikuni (general application)

Click here for more information on Mikuni Carbs in the REF section of the Sportsterpedia.

The VM series carbs are round slide Mikunis, 34, 36, 38 MM etc. Only Mikuni round slide carbs are designated as VM. Mikuni lists the following Vintage Carb Kits: [75]
001-200....HDS-101/38mm.... Sportster/Shovelhead
001-204....HDS-101A/40mm.... Sportster/Shovelhead
001-202....HDS-101B/44mm.... Sportster/Shovelhead
So any of these 3 sizes will work.

Mikuni (**XR-750 Racing Engines Only**)	
VM-36-1 VM-36-4 VM36/39	1972-1980 XR-750 / 36 mm with a round slide [76][77]

TM38-85 (47mm spigot dia.) TM38-86 (43mm spigot dia.) TM38-85 (47mm spigot dia.) TM38-86 (43mm spigot dia.)	1989-2003 XR-750 / 38 mm with a flat slide[78]

The correct version of the VM38 for an ironhead Sportster is the VM38-9. [79] [80] [81]
The VM38-"9" was setup and extensively tested by Jerry Branch for the stock Sportster engine using flow bench tech for the time. [82]

38mm Carb Types	Main	Pilot	Needle Jet	Throttle Valve	Jet Needle	Air Jet
VM38-9 (43mm spigot)[83]	330	30	Q-2	2.5	6DP1	0.5 2.0

Bendix/ Zenith I6P12 Carb (1972-Early 1976)

Sub Documents

- Bendix Carb Identification
- Rebuilding the Bendix Carb
- Bendix Carb Functions, Adjustments, Tuning.

- Model 16P12 sidedraft carb (standard for Harley's) is a horizontal plain tube type carb with a fuel bowl, single ring shaped float, an accelerator pump, idle mixture adjusting needle and a throttle stop screw for idle speed adjustment.[84]
- The throttle body casting contains an integral venture and a fuel valve seat that is pressed into the body. The underside of the throttle body contains a long boss that the main jet and discharge tube assembly screw into with the end of the tube projecting up into the venture.[85]
- Note for 1973 and earlier: The change letter (A or B) is stamped near the Basic Bendix carburetor part number (13609) for identifying carburetors with modifications. Idle tube 27749-72 (marked A) is standard on carbs marked with a change letter (A). Idle tube 27750-72 (marked B) is standard on carbs marked with change letter (B).[86]
    - **Fuel Supply Stream**: Fuel under pressure enters the float chamber through the fuel inlet and valve (needle and seat. The bowl fuel level is automatically maintained by the float which opens and closes the needle seat valve to supply varying fuel demands to the engine.[87]
    - **Accelerator System**: The accelerator pump controls the amount of additional fuel discharged into the air system upon sudden throttle opening and it consists of a pump assembly, accelerating jet, check valve and the mechanical linkage connected to the throttle shaft.[88]
    - **Idle System**: Fuel for idle is drawn in from the main metering well through the idle tube and is mixed in the channel leading to the idle discharge holes with air entering the idle air bleed. At low idle speed, throttle plate is positioned to expose only the #1 idle discharge hole to engine vacuum. Air is admitted to the idle channel through the #2, #3 and #4 (1972 and later) idle holes. Air mixes with the fuel/ air mixture in the channel and is discharged through

the #1 idle hole. As the throttle plate is opened, the #2, #3 and finally the #4 hole begins discharging fuel/ air mixture to supply the increased fuel required for higher engine speeds. The idle needle regulates the fuel/ air mixture flowing thru #1 discharge hole. Turning the needle clockwise (in) leans out the mixture while turning counterclockwise (out) richens the mixture. The idle speed is set by adjusting the throttle stop screw instead of the idle adjusting needle.[89)]

- **Choke System**: Before cranking the engine, the throttle should be opened to expose all three idle holes. The choke plate should be held fully closed during the cranking. After the engine starts, open the choke slightly. A hole in the choke plate helps prevent over-choking when the engine is started. The choke should be moved to wide open when the engine is partially warmed up.[90)]
- **High Speed metering System**: The fuel for the engine operation from off-idle to full throttle is supplied from the fuel bowl through the main metering jet, metering well and discharge tube. As the fuel flows thru the metering well and tube, it mixes with air entering the well vent to provide the correct fuel/ air mixture ratio for all engine speeds and loads. A series of air bleed holes in the discharge tube permits air from the well vent to enter the bowl below the level of the fuel in the float chamber. This reduces the average density of the fuel and enables it to flow freely at low suction. At high engine speeds, (and high suction), the air to fuel proportion thru the main metering system is reduced to provide a richer mixture needed for peak performance. [91)]

Application Dimensions: [92)]

- Engine Size 60-75 CID
- Throttle Bore 1.653“ [93)]
- Choke Bore 2.0”
- Venturi Diameter: 38-40 mm range
- Fuel Inlet Fitting: 1/8“-27 pipe thread

Features: [94)] [95)]

- 38mm[96)]
- Integral float chamber
- Low speed needle
- Stock Bendix carbs for Sportsters have fixed main jets and course threads. Aftermarket Bendix carbs are offered with adjustable mains and fine threads.
- Throttle stop screw
- Throttle lever
- Manual choke lever: allows operator to control engine warm-up
- Barrel type accelerator pump
- Internal bowl venting: minimizes the effects of air cleaner deterioration
- Bowl drain plug
- ID number stamped on top over the butterfly plate
- All aluminum die cast construction
- Intake manifold (27021-71A)[97)]

Year Model XLH/ XLCH	Serial Number	Main Jet Sizes (mm)	Low Speed Idle Jet

E1972	27155-72 [98]	0.90mm (27612-71)	**Early '72** (27749-72) **Late '72-'74** (27750-72)
L1972-1974	27155-72A [99]	**Late '72-'73** 0.95mm (27614-71) 1.00mm (27618-71) 1.05mm (27619-71 standard) **Added in L'74-E'76** 1.10mm (27620-71 standard) [100] 1.15mm (27621-71) 1.20mm (27622-71) 1.25mm (27623-71)	
1975-Early 1976 Including all '71-'75 FX models	27155-72B [101] [102] [103]		

Bendix Main Jet Identification [104]

Model Info	HD Main Jet Part #	Bendix Main Jet Part #	Bendix Main Jet Size	Drill Size
1972-1974 XL, XLCH 1971-1975 FL, FLH, FX, FXE	27612-71 27614-71 27618-71 27619-71 27620-71 27621-71 27622-71 27623-71	C66-173 C66-174 C66-155 C66-156 C66-157 C66-143 C66-158 C66-159	18 19 20 21 22 23 24 25	0.90 mm (0.0354”) 0.95 mm (0.0374“) 1.00 mm (0.0394”) 1.05 mm (0.0413“) 1.10 mm (0.0433”) 1.15 mm (0.0453“) 1.20 mm (0.0472”) 1.25 mm (0.0492“)
1975 and later XL, XLCH Late 1975 FL, FLH, FX, FXE	27651-75 27652-75 27653-75 27654-75 27655-75 27656-75	C66-183-19 C66-183-20 C66-183-21 C66-183 C66-183-23 C66-183-24	19 20 21 22 23 24	0.95 mm (0.0374”) 1.00 mm (0.0394“) 1.05 mm (0.0413”) 1.10 mm (0.0433“) 1.15 mm (0.0453”) 1.20 mm (0.0472“)
Bendix part # is stamped on the hex head side of the jet. The standard 1.10 mm for 1975 and later carbs is only labeled C66-183. All other jets for '75 & later models have the full # with suffix				
Carb Idle Speed	700- 900 RPM [105]			

Keihin "butterfly" or "non-CV" Carb (Late 1976-1987)

Sub Documents

- Keihin Butterfly Carb Identification
- Rebuilding a Keihin Butterfly Carb
- Keihin Butterfly Carb Function and Tuning
- Origin of the Keihin BH Carburetor

- The Keihin non-CV carburetor is a horizontal type with a fuel bowl, single ring-shaped float, an accelerating pump, idle mixture adjusting needle and a throttle stop screw for speed adjustment. [106)]
- The throttle body casting contains an integral venture and a fuel valve seat that is pressed into the body. The underside of the throttle body contains a boss. The main jet screws into the boss and holds the bleed tube in place.[107)]
    - **Operation**: Fuel from the gas tank passes through the fuel valve, onto float chamber. The fuel entering causes the float to rise until it shuts off the fuel valve, stopping the flow at a level predetermined by float level setting. [108)]
    - **Idle or Slow System**: The slow system functions at idle, low and intermediate speeds when throttle valve is closed or only partially open. At idle, fuel enters the main jet and, after being metered there, enters the slow jet where it is metered again. Fuel from the slow jet enters the slow jet bleed tube where it mixes with air through the slow air passage. Fuel mixture is regulated by adjusting the idle (low speed) mixture screw. When the throttle valve is closed, fuel mixture flows into the venture almost entirely through the idle port. As the throttle valve gradually opens, fuel mix discharge is transferred to the bypass. The slow jet bleed tube is actually a part of the slow jet. [109)]
    - **The Main System**: The main system functions at intermediate and high speeds as the throttle valve opens further. Fuel is metered by the main jet and enters the main jet air passage. The fuel/air mixture then exits from the main nozzle and into the venturi. [110)] There is no metering needle.
    - **The Accelerating Pump System**: The accelerating pump system works with sudden throttle openings (rapid acceleration) to quickly inject fuel into the carb to provide extra fuel for the engine demand. Rapid throttle action pushes the pump rod down, flexing the diaphragm, which compresses fuel underneath the diaphragm, forcing it up past the check valve and out the pump nozzle into the venturi. The check valve prevents backflow while the pump nozzle meters the flow. Spring action then returns the diaphragm back to it's original position. As the diaphragm returns, a new supply of fuel flows in and under it so the system will be ready to repeat the cycle with the next rapid throttle action detected. [111)]
    - **The Choke System**: The choke is manually set by pulling out on the choke button. Pulled all the way out is fully closed (for cold engine), partially open (for warm engine) or pushed all the way in, fully open (for warm engine). [112)]

- Integral Float Chamber
- Manual Choke
- 3 different models

- Model Year Changes

Sportster Keihin Butterfly Carburetors by Year Model

Sportster Model	Year Carb Used	HD Part#	Flange / Casting Number	Main Jet Size	Low Speed Jet Size	Initial Mixture screw setting	Accel Pump spring position
XLH, XLCH	Late 1976	27153-76[113]	B50A [114]	(140 std) [115] Optional jets [116] - 130, 135, 145, 150 155, 160, 165, 170, 175[117]	100	7/8 [118]	Upper [119]
XLH, XLCH, XLT	1977-1978	27153-77 [120]	B50B [121] B50C	(160 std) [122] (165 std) [123] Optional jets [124] 130, 135, 145, 150, 155, 160, 165, 170, 175 [125]	75	1-1/4 [126]	Center [127]
XL, XLCH, XLS	1979	27469-78 [128] 27469-78A [129]	B83A B83B	165 160-above 4000' [130]	65 [131]		
XL, XLS	1980	27469-80 27469-80A [132]	B83C B83D	160 165	65 [133]		
XL, XLS	E81-E82 L81-E82	27469-81 [134] 27469-81A [135]	B83E B83F	160 160	68 [136]		
XL, XLS	Late 1982	27469-82	B83G	150	68 [137]		
XL, XLS, XLX	E1983	27469-83	B83H	160	52 [138]		
XL, XLS, XLX	L1983	27469-83A	B83H	160	52 [139]		
XL, XLS, XLX	1984	27469-83B	B83K	160	52 [140]		
XL, XLS, XLX	1985	27469-83C	B83K	160	52 [141]		
XLCR 1000 [142]	1977-1978	27148-77	B60A B60B	185	90	1-1/8 [143]	Upper [144]
XLCR 1000 quiet engine [145]	1977-	27146-77	B75A	175	90	1-1/2 [146]	Upper [147]
XL 883	1986-1987	27501-86A [148]	B83H	155	52		
XL 1100	1986	27502-86A [149]	B83H	155	52		
XL 1100	1987	27502-86B [150]	B83H	150	52		

Main Jets [151] [152]						
HD#	27397-76	27398-76	27399-76	27615-76	27400-76	27401-76
Size	155 1001-104-155	150 1001-104-150	145 1001-104-145	140 1001-104-140	135 1001-104-135	130 1001-104-130
HD#	27356-76	27416-76	27417-76	27418-76	27419-76	27420-76
Size	185	180	175	170	165	160

Other HD Keihin Carburetors by Year Model

Other HD Model	Year Carb Used	Serial Number	Flange / Casting Number	Main Jet Size	Low Speed Jet Size	Initial Mixture screw setting	Accel Pump spring position
All FX	76	27155-76	860A [153] 860B	185 [154]	100	7/8	center
All FL	76-E77						
The (860B) had the longer 59.5mm accelerator pump rod. [155]							
All FX All FL	L77-E78	27155-76A [156]	860C [157] 860D	175 [158]	88	1-1/2	center
FX, FXE, FXS	L1978-1979	27468-78A [159]	B81B	160	72		
FLH-80 Classic	L1978-1979	27466-78A [160]	B78B	165	70		
FL, FLH	L1978-1979	27467-78A [161]	B80B	165	70		
FXS-80 FXEF-80	1979	27472-79 [162]	B79A	160	72		
FXEF	1979	27466-78A [163]	B78A	160	72		
?	1980	27467-80					
FLH-80 Classic Sidecar (79-80)	1980	27466-80A [164]	B78D	165	68		
FL, FLH	1980	27467-80A [165]	B80D	165	68		
FXE, FXEF, FXS	1980	27468-80A [166]	B81D	160	72		
FXWG	1980	27470-80 [167]	B28D	160	72		
FXS-80 FXEF-80 FXB	1980	27472-80A [168]	B79D	160			
	1981 ?	27494-81	B78E				
FLH-80 Classic	1981-1984	27494-81A [169]	B78F	165	70		
FXEF-80 FXE-80	1981-1983	27472-81A [170]	B79F	160 (FXEF-80) 165 (FXE-80)	72		

FXS-80, FXB FXWG, FXSB	1981-1983	27470-81A [171]	B28H	160 all FX models (except FXE-80)	72		
FX models	1984						
?	?	27469-83B	B83K				
FXST	1984	27029-83D	02BL	160	50		
FX models	1985	27499-85 41mm	99BA	165	52		
?	?	?	02BP				
FX models	1986	27029-86B	02BQ	170	50		
All FXR, SOFTAIL	1987	27029-86B [172]	02BR	165	50		
All FLT	1987	27034-86B [173]	B88R	170	50		
All FLT, FXR, SOFTAIL (Ex Cal.)	1988-1989	27029-88 [174]	F58A	165	52		
All FLT, FXR, SOFTAIL (Cal. and Swiss only)	1988-1989	27026-88A [175]	F59B	140	42		

- HD part numbers are on a sticker on top of the carb on the choke cable side. Over the years, they may be not readable or may be missing.
  Refer to the flange or ID casting numbers for specific engines used on.
- 76-78 model numbers are in the side flange near the manifold.
- 79-up model numbers are on the lower right side ID casting block.
- Carburetors with the latest letter stamped on the flange had improved sealing on the welch plugs, throttle shaft ends and idle mixture screw. [176]
- Carb Idle Speed: 900 RPM [177]
- Torque Specs:[178] Late 1976-1985, Carburetor Mounting Nuts - 19 ft/lbs (26 Nm)
- The original idle mixture setting for E76 Keihin carbs was 1-1/2 turns out and adjust from there. [179]
  In December of 1976, that was changed to 7-8 turns out for FL and FX models. [180]
  In June of 1977, L77-up FL and FX models were changed back to 1-1/2 turns out with earlier models remaining at 7/8 turns.

Boiling Gas

Gas getting to the boiling point can happen for several reasons.
Having the gas line resting against the engine, the float set too low and others will also attribute to boiling gas.
The problem from hot gas is a vapor lock if the gasoline is heated to the point where it vaporizes before it reaches the intake. [181]

A lean bike will run hot:
Make sure the intake seals really well and make sure they're not leaking. [182)]

Engine heat transferring thru the carb:
On BTs, an erratic idle condition can happen due to fuel vaporization in slow moving traffic or at high ambient temperatures.
The engine temperature may rise to the point where it heats the carburetor enough to boil the fuel.
When this happens, the engine can idle erratically and stop.

You may be able to look inside your gas tank after the bike has been sitting for about 15 minutes and see gas boil inside the tank. [183)]
While your engine is running, the air going through the carb, cools the carb.
But when you shut off the engine, the heat from your heads and cylinders transfers into your carb. With nothing to cool your carb, you can hear your vent gurgling.
If your carb vent is plugged, it can push gas from your bowl through your main jet, right into your intake.
You can get fiber insulators that will help lower the heat transfer to your carb.
The fix is to install a phenolic spacer between the carb and the manifold.
See Heat Spacer/Insulator Block below.

Fuel line touching the engine:
Fuel line routing options are limited by the design. Keep the fuel line away from touching the cylinders/heads.
The air flow between them should be adequate to keep the fuel cool as long as the fuel line is not touching a heat source.

Below, a fuel boiling problem was found in a 77 XLCH by XLF member, gemeinschaft.

> I went for a ride yesterday, it was great. Then, I smelled gasoline. I noticed gas coming out of the carb after I stopped. [184)]
> I double checked and yes, the petcock was turned off. I looked at the fuel filter and there were bubbles as the gasoline was at a rolling boil (in the clear tube fuel filter).
> I backed off and waited for a while and pretty soon it all evaporated.
> My petcock is on the left side and it runs down by the horn in between the two cylinders. (Talk about a heat source).
> The fuel line literally touches the fins of the rear cylinder and then goes back up to the carb.

This fuel line is in the lower “V” and touching the cylinders. Bubbles were found in the filter. [185)]

Possible fixes to keep the fuel line away from the engine:

- You can route the line so it avoids the heads and cylinders as best you can. [186)]
  You can use a longer or shorter line to allow you some flexibility in routing.
  You want a steady downward slope from the petcock to the carb eunning gravity type petcocks.
- Use fuel line with braided stainless-steel sheathing to protect the rubber hose from heat.
  If your fuel hose melts and spills gas onto the motor, you won't soon forget it.
- Slip a length of coiled wire (or a spring) over the braided fuel line where it goes between the jugs.
  This has been done on everything from hot rods to airplanes for longer than anyone can remember.
- You can take the spiral wire from a paper notebook and stretch it some and run the fuel line through it.
  You just want to keep it from touching the cylinders/heads. [187)]
- Use clothes pins on the fuel line to create some space for the line.

Clothes pins attached to fuel line for separation. [188)]

Heat Spacer / Insulator Block

The insulating block was not known to be suggested for use on Sportster Bendix or Keihin butterfly carbs by the MoCo.
In December of 1976, insulating block (27412-57) was suggested to use on 76 and later FL and FX models (one block on FX and two blocks on FL models). [189)]
This was suggested to eliminate erratic idle due to fuel vaporization in slow moving traffic or at high

ambient temperatures.
The engine temperature may rise to the point where it heats the carburetor enough to boil the fuel. When this happens, the engine can idle erratically and stop. To prevent this, place the insulating block(s) between the engine and carburetor.
Click here to view the TSB page in the Sportsterpedia. Click on the “Y” next to M-707 to view download the PDF.

In August of 1977, a Service Bulletin was issued regarding the use of a new spacer block (29250-78A) on 1977→ 1200CC engines. [190)]
The bulletin addresses proper installation for better sealing of the carb to A/C and carb/insulator block/manifold seal.
Click here to view the TSB page in the Sportsterpedia. Click on the “Y” next to M-715 to view download the PDF.
This kit was also suggested for installation of the spacer block.

PART #	DESCRIPTION	QUANTITY	REPLACES
7739	LOCK NUT 5/16”-18 x 11/32“ X 1/2” Hex	2	7725
5895	INSULATING SPACER	1	-
24820-78	STUD 5/16“-18 x 5/16-18	2	24818-52
27077-78	GASKET	2	-

In April of 1984, a Service Bulletin was issued a gasket (27023-71) was added between the carb and insulator block on 1340cc engines assembled in February, 1984.
On earlier 1340's, if an air leak was found or suspected between the carburetor and insulator block, the gasket was to be installed.
Click here to view the TSB page in the Sportsterpedia. Click on the “Y” next to M-888 to view download the PDF.

Some Sportster owners say they have never needed them and others use them regularly.
Argument for using the spacer:
[191) 192)]

The Phenolic fiber spacer helps with hot idle or starting problems. One infuriatingly simple thing that affects idle, starting and carb farts when your engine is hot, is this phenolic fiber spacer. [193)] It's between the carb and manifold, which some models had and others did not. It stops engine heat from flowing into

the carb. If your model doesn't have one of these stock, you can cut one out of a sheet of fiber about 3/16” thick. JP Cycles or others sell one that is a bit thicker and might work even better. There should be a gasket on each side of the spacer while still using the rubber O-ring on the carb flange. Of course, make sure both the carb flange and the manifold are filed nice and flat with a 10-inch flat file first. Without it, your carb can get too hot to touch within minutes of the bike being parked with a hot engine. Even the air filter gets hot. There is a lot of heat flowing from the heads, up the manifold and into the carb which makes it hard to start and idle rough. The heat vaporizes the fuel in the float bowl and it can boil and come out the overflow tube at the bottom of the float bowl. This also means the tiny amount of fuel trying to go through the idle adjuster screw and into the carb throat can also vaporize. Fuel going into the engine needs to be tiny globules of liquid fuel, not vapor. Putting a heat-blocking spacer on is really worth the effort if you ride a lot in city traffic. (where idling at the lights will allow heat to flow into the carb while there is no cooling wind) With a kick only XLCH, the easier hot starting is a Godsend.

Here are some part numbers for the different insulator blocks used on 4 stroke Harleys. There is no known insulator block that was factory installed on a Bendix Carb as used on Sportsters.

- 27412-57 for 57-65 XL FL, FX. (Linkert)
- 27015-66 for XLH 66-71.XLCH '66;70-71 (Tillotson)
- 27012-67 (has 1 longer stud) 66-69 XLCH67-70 BTs (Tillotson)
- 29250-78 for 76-89 BTs (Keihin butterfly)
- 29250-78A for 78-E84 FL,FLH and Late 78-E84 FLT and 80-85 FXR (Keihin butterfly)
- 27003-86 for 86-87 XL (Keihin butterfly)
- 27003-86A for 86-87 XL (Keihin butterfly)
- 29266-86 plastic, for 86-87 XL (Keihin butterfly).

Swapping to a Keihin CV Carb

See Ironhead - Installing a Keihin CV Carb in the REF section of the Sportsterpedia.

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